

Express Mail Certificate No. EV298592760US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
APPLICATION FOR LETTERS PATENT

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Title : LOCKING DEVICE TO LOCK A COLLAPSIBLE  
TREADMILL DECK IN A FOLDED POSITION

9 Claims

8 Sheets of Drawings

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1     **LOCKING DEVICE TO LOCK A COLLAPSIBLE TREADMILL DECK**  
2                             **IN A FOLDED POSITION**

3     **BACKGROUND OF THE INVENTION**

4     1. Field of the Invention

5             The present invention relates to exercise treadmills, and more  
6     particularly to a locking device to lock a collapsible treadmill deck in a folded  
7     position and the locking device is convenient to use to firmly hold the folded  
8     treadmill deck in position.

9     2. Description of Related Art

10            Treadmills are common items of exercise equipment and are popular for  
11     people to do indoor exercises, such as in-place running, jogging, walking etc. A  
12     conventional treadmill is bulky and is inconvenient to store or transport.

13     Therefore, the treadmill today generally uses a collapsible treadmill deck to  
14     reduce a size of the whole treadmill for temporary storage and transportation. A  
15     conventional collapsible treadmill comprises a base assembly, a collapsible  
16     treadmill deck and an upright structure. The upright structure is mounted on the  
17     base assembly. The treadmill deck is pivotally mounted to the base assembly.  
18     Therefore, the treadmill deck can be held in either a horizontal position or a  
19     vertically folded position.

20            There are various means that can be found to keep the treadmill deck to  
21     stay in a given folded position. One of them is to use a locking device with a lock  
22     and a telescopic tube to support and lock the telescopic tube while the treadmill  
23     deck is in the given folded position. The telescopic tube has a top end and a  
24     bottom end and comprises an inside tube and an outside tube. The top end is

1 pivotally mounted to the treadmill deck. The bottom end is pivotally mounted to  
2 the base assembly. The inside tube is telescopically mounted in the outside tube  
3 and pivotally connects to the treadmill deck. The outside tube pivotally connects  
4 to the base assembly. The lock is mounted on the telescopic tube to interlock the  
5 inside tube with the outside tube in position so as to retain the treadmill deck in  
6 the given folded position.

7           However, the locking device to lock the telescopic tube must be  
8 convenient to use and reliable to avoid the treadmill deck suddenly falling from  
9 the folded position. In particular, if a person inadvertently bumps into or leans  
10 on the treadmill deck, the treadmill deck is required to stay in the folded position.  
11 The locking device for the collapsible treadmill deck should be convenient to  
12 unlock such that it will also be convenient to unfold the treadmill deck for a  
13 person to put down the treadmill deck to do the in-place exercises.

14           Therefore, the present invention provides an improved locking device to  
15 lock firmly a collapsible treadmill deck in a given folded position to mitigate or  
16 obviate the aforementioned problems.

## 17 SUMMARY OF THE INVENTION

18           The main objective of the invention is to provide a locking device for a  
19 collapsible treadmill and the locking device is convenient to use and will firmly  
20 hold a treadmill deck of the treadmill in a folded position.

21           A collapsible treadmill includes a base assembly, a collapsible treadmill  
22 deck and a locking device to lock the collapsible treadmill deck in a folded  
23 position. The locking device includes a telescopic tube and a latch. The  
24 telescopic tube supports the collapsible treadmill deck in the folded position and

1 includes an inside tube and an outside tube. The outside tube has a pawl hole, a  
2 top end with an opening, and a bottom end. The bottom end is pivotally mounted  
3 to the base assembly. The inside tube is telescopically mounted in the outside  
4 tube and has an outside end pivotally mounted on the treadmill deck and at least  
5 one positioning hole aligned with the pawl hole. The latch includes a stationary  
6 bracket and a pivot pawl. The stationary bracket is fastened on the outside tube  
7 and corresponds to the pawl hole. The pivot pawl is pivotally mounted on the  
8 stationary bracket and has an inside end extended into the pawl hole to engage  
9 one of positioning holes to interlock the inside tube with the outside tube to  
10 firmly hold the folded treadmill deck in position.

11 Other objectives, advantages and novel features of the invention will  
12 become more apparent from the following detailed description when taken in  
13 conjunction with the accompanying drawings.

#### 14 BRIEF DESCRIPTION OF THE DRAWINGS

15 Fig. 1 is a side plan view of a treadmill with a collapsible treadmill deck  
16 that uses a locking device in accordance with the present invention when the  
17 treadmill deck is in a horizontal position;

18 Fig. 2 is a side plan view of the treadmill in Fig. 1 when the treadmill  
19 deck is folded up in a vertically folded position;

20 Fig. 3 is an exploded perspective of a first embodiment of a locking  
21 device in accordance with the present invention;

22 Fig. 4 is an operational sectional plan view of the locking device in Fig.  
23 3 when a pivot pawl of the locking device engages a positioning hole of an inside  
24 tube of a telescopic tube;

1            Fig. 5 is an operational sectional plan view of the locking device in Fig.  
2            3 when the pivot pawl of the locking device disengages the positioning hole;

3            Fig. 6 is an operational sectional plan view of the locking device in Fig.  
4            3 when a movable bracket is pulled out to move an inside end of the pivot pawl  
5            out of the positioning hole;

6            Fig. 7 is an operational sectional plan view of a second embodiment of a  
7            latch of the locking device; and

8            Fig. 8 an operational sectional plan view of a third embodiment of the  
9            latch of the locking device.

#### 10        DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

11           With reference to Figs. 1 and 2, a locking device (10) in accordance with  
12           the present invention is used for a collapsible treadmill (not numbered). The  
13           collapsible treadmill comprises a base assembly (21), an upright structure (22),  
14           and a collapsible treadmill deck (24). The base assembly (21) has an inclination  
15           mechanism (23) to change an inclination of the treadmill deck (24). The upright  
16           structure (22) is mounted to the base assembly (21). The treadmill deck (24) has  
17           a bottom (not numbered), a front end (not numbered) and a rear end (not  
18           numbered). The front end is pivotally mounted to the inclination mechanism (23)  
19           so that the treadmill deck (24) can be folded from a horizontal position as shown  
20           in Fig. 1 to a vertically folded position as shown in Fig. 2.

21           With further reference to Figs. 3 and 4, the locking device (10)  
22           comprises a telescopic tube (not numbered) and a latch (30). The telescopic tube  
23           is used to support the treadmill deck (24) as the treadmill deck (24) is folded up  
24           in a given position and comprises an inside tube (11) and an outside tube (12).

1 The inside tube (11) has an inside end (not numbered) and an outside end (not  
2 numbered). The outside end is pivotally mounted on the bottom of the treadmill  
3 deck (24) at the rear end. The inside end is telescopically mounted in the outside  
4 tube (12) so the inside tube (11) can be either extended out or retracted into the  
5 outside tube (12) to change a length of the telescopic tube. The outside tube (12)  
6 has a top end (not numbered) and a bottom end (not numbered). The top end has  
7 an opening (not numbered). The bottom end is pivotally mounted to the base  
8 assembly (21). The inside end of the inside tube (11) slidably extends into the  
9 outside tube (12) through the opening, and the inside tube (11) is slidably held in  
10 the outside tube (12)

11 The inside tube (11) further has a side (not numbered) and one or  
12 multiple positioning holes (111). The positioning holes (111) are in-line and are  
13 defined through the side of the inside tube (11). Each of the positioning holes (11)  
14 has a top edge (not numbered) and a bottom edge (not numbered). The outside  
15 tube (12) further has a pawl hole (121) and an exterior periphery (not numbered).  
16 The pawl hole (121) is defined through the exterior periphery and is selectively  
17 aligned with a respective one of the positioning holes (111).

18 The latch (30) is used to fasten the inside tube (11) with the outside tube  
19 (12) in position as the treadmill deck (24) is folded up from the horizontal  
20 position to the folded position. The latch (30) comprises a pivot pawl (33) that  
21 extends into the pawl hole (121) to engage one of the positioning holes (111) to  
22 interlock the inside tube (11) with the outside tube (12). Therefore, the inside  
23 tube (11) cannot be further moved related to the outside tube (12) so that the  
24 folded treadmill deck (24) can be supported by the locked telescopic tube in the

1 given folded position.

2 A first embodiment of the latch (30) can be implemented to comprise a  
3 stationary bracket (31), a movable pawl bracket (32), a pivot pawl (33), a  
4 connecting pin (34), a restitution spring (35), a torsional spring (36) and a clamp  
5 (37). The stationary bracket (31) is fastened on the exterior periphery of the  
6 outside tube (12) and corresponds to the pawl hole (121). The stationary bracket  
7 (31) may be an L-shaped bracket and comprises a stationary base (311) and a  
8 side wall (314). The stationary base (311) has a top (not numbered) and two sides  
9 (not numbered). The side wall (314) is formed upward at one of the sides and  
10 protrudes from the top of the stationary base (311) and has a top (not numbered),  
11 two opposite sides (not numbered), a transverse elongated hole (310), a hook  
12 (312) and a stationary spring holder (313). The transverse elongated hole (310) is  
13 defined through the both sides of the side wall (314). The hook (312) is formed at  
14 the top and is bent toward the stationary base (311) at one of the sides of the side  
15 wall (314) to form a U-shaped hook. The stationary spring holder (313)  
16 protrudes from the other side of the side wall (314) to hold the restitution spring  
17 (35).

18 The movable pawl bracket (32) is movably mounted on the stationary  
19 bracket (31) and comprises a guiding side wall (321) and a sliding base (322).  
20 The sliding base (322) is slidably mounted on the top of the stationary base (311)  
21 of the stationary bracket (31) and has a top (not numbered) and a side (not  
22 numbered). The guiding side wall (321) extends perpendicularly upward from  
23 the top at the side of the sliding base (322), is slidably held between the hook  
24 (312) and the stationary base (311) of the stationary bracket (31) and has a top

1 (not numbered), an inside end (not numbered), an outside end (not numbered),  
2 two sides (not numbered), a movable spring holder (323), a curved grip (324)  
3 and a pin hole (326). The movable spring holder (323) protrudes from one of the  
4 sides of the guiding side wall (321) at a position outside the stationary bracket  
5 (31). The grip (324) is formed at the outside end of the guiding side wall (321) by  
6 bending the outside end to form a loop. The pin hole (326) is defined through  
7 both the sides of the guiding side wall (321) and is aligned with the transverse  
8 elongated hole (310).

9           The connecting pin (34) connects the movable bracket (32) to the  
10 stationary bracket (31) and comprises a shank (not numbered) and an enlarged  
11 head (not numbered). The shank has a distal end (not numbered), a proximal end  
12 (not numbered) and an annular groove (not numbered). The enlarged head is  
13 formed integrally at the distal end. The annular groove is formed at the proximal  
14 end. The proximal end extends into the transverse elongated hole (310) in the  
15 stationary bracket (31) and the pin hole (326) in the movable bracket (32) and  
16 extends out of the pin hole (326).

17           The pivot pawl (33) is pivotally mounted on the extended proximal end  
18 of the shank of the connecting pin (34) and has a through hole (331), an inside  
19 end (not numbered), a transverse groove (332) and an inclined surface (333). The  
20 proximal end of the shank enters the through hole (331) of the pivot pawl (33)  
21 and extends out of the through hole (331). The transverse groove (332) and the  
22 inclined surface (333) are formed at the inside end of the pivot pawl (33).

23           The torsional spring (36), such as a coil spring is mounted on the shank  
24 of the connecting pin (34) between the pivot pawl (33) and the guiding side wall



1 (321) of the movable bracket (32) to provide a restitution force to pivot the pivot  
2 pawl (33). The clamp (37), such as a C-clamp is attached to the annular groove of  
3 the shank to hold the pivot pawl (33) with the connecting pin (34). The  
4 restitution spring (35) is attached to the stationary and the movable spring  
5 holders (313, 323). The restitution spring (35) will be stretched by pulling the  
6 movable bracket (32) to produce a restitution force that pulls the movable  
7 bracket (32) back to its original position as the movable bracket (32) is released.

8           With reference to Figs. 1, 2 and 4, when the treadmill deck (24) is folded  
9 up from the horizontal position to the vertically folded position, the movement of  
10 the treadmill deck (24) will pull the outside end of the inside tube (11), which  
11 draws the inside tube (11) upward along the outside tube (12). The movement of  
12 the inside tube (11) related to the outside tube (12) will cause the bottom edge of  
13 a current one of the positioning holes (111) to abut the inclined surface (333) of  
14 the pivot pawl (33), which simultaneously pivots the pivot pawl (33) in a  
15 clockwise direction to compress the torsional spring (36) to produce a spring  
16 force. The inclined surface (333) will guide the pivot pawl (33) to leave the  
17 current one of the positioning holes (111). The spring force in the torsional  
18 spring (36) will force the pivot pawl (33) so that the inside end of the pivot pawl  
19 (33) will slide against the inside tube (11) as the inside end of the pivot pawl (33)  
20 has left one of the positioning holes (111). However, the inside end of the pivot  
21 pawl (33) will fall into the next one of the positioning holes (111) and cause  
22 simultaneously a clicking sound because of the movement of the inside tube (11).  
23 Such an operation for the pivot pawl (33) will repeatedly occur until the  
24 treadmill deck (24) has been folded up at a given position and the movement of

1 the inside tube (11) is stopped.

2 The inside end of the pivot pawl (33) is held in one of the positioning  
3 holes (33). When the treadmill deck (24) is released, the weight of the treadmill  
4 deck (24) will press the inside tube (11) such that it will slightly retract into the  
5 outside tube (12) until the top edge of the current one of the positioning holes  
6 (111) engages the transverse groove (332) of the pivot pawl (33). Meanwhile, the  
7 pivot pawl (33) abuts against the top of the sliding base (322). In this state, the  
8 inside tube (11) and the outside tube (12) are interlocked by the pivot pawl (33)  
9 to position the treadmill deck (24) in the folded position.

10 With reference to Figs. 1, 2, 5 and 6, when the treadmill deck (24) needs  
11 to be placed on the ground for exercising in the horizontal position, slightly  
12 pushing the treadmill deck (24) upward will simultaneously draw the inside tube  
13 (11) from the outside tube (12). The small movement of the inside tube (11)  
14 causes the top edge of the engaged positioning hole (11) to leave the transverse  
15 groove (332). Meanwhile, pulling the movable bracket (32) out can move the  
16 inside end of the pivot pawl (33) outside the positioning holes (111) so that the  
17 inside tube (11) can be retracted into the outside tube (12) to permit the treadmill  
18 deck (24) to be in the horizontal position. Once the treadmill deck (24) is in the  
19 horizontal position, the restitution spring (35) will return the movable bracket  
20 (32) to its original position for a subsequent operation of folding up the treadmill  
21 deck (24).

22 With reference to Figs. 2 and 7, a second embodiment of the latch (30')  
23 is implemented simply with a stationary bracket (41), a pivot pawl (33), a  
24 torsional spring (36), a connecting pin (43) and a pivotal handle (42). The

1 stationary bracket (41) is simply a modification of the stationary bracket of the  
2 first embodiment and comprises a stationary base (411) and a side wall (414).  
3 The pivot pawl (33) has the features described in the description of the first  
4 embodiment and is pivotally mounted on the side wall (414) with the connecting  
5 pin (43) and the torsional spring (36). The connecting pin (43) is attached to the  
6 side wall (414). The pivot pawl (33) is pivotally mounted on the connecting pin  
7 (43). The torsional spring (36) is mounted on the connecting pin (43) between  
8 the pivot pawl (33) and the side wall (414). The handle (42) is attached to the  
9 pivot pawl (33) to pivot the pivot pawl (33) to allow the inside end of the pivot  
10 pawl (33) to escape the positioning holes (111) when it is required to lay the  
11 folded treadmill deck (24) in the horizontal position.

12 With reference to Figs. 2 and 8, a third embodiment of the latch (30”) is  
13 implemented simply with a modification of the handle (42) described in the  
14 second embodiment. The handle (42) is modified with a pulling cord (50) that  
15 can be pulled downward to pivot the pivot pawl (33). The operation and the  
16 effects of the third embodiment are similar to the second embodiment, therefore,  
17 a detailed description is not provided further.

18 Even though numerous characteristics and advantages of the present  
19 invention have been set forth in the foregoing description, together with details  
20 of the structure and function of the invention, the disclosure is illustrative only,  
21 and changes may be made in detail, especially in matters of shape, size, and  
22 arrangement of parts within the scope of the appended claims.